

# State Implementation Plans



Air Quality Board Briefing  
March 5, 2008







# Air Quality Standards

- EPA establishes health standards based on epidemiological studies and laboratory tests
- Standards are set to protect the most sensitive people
  - Elderly, children, people with respiratory and cardiopulmonary issues
- Cost is not considered



# Pollutants of National Concern

- **Ozone ( $O_3$ )** – Spread out over wide area
  - Problem / Health Effect: Long term lung damage (cracking, etc)
  - Sources: Vehicles, Forests, Combustion Processes
- **Particulate Matter ( $PM_{10}$  and  $PM_{2.5}$ )** – Spread out over wide area
  - Problem / Health Effect: Gets caught deep in lungs – Asthma
  - Sources: Vehicles, Woodburning, Tilling (summer), Sand/Gravel Operations
- **Sulfur Dioxide ( $SO_2$ )** – Localized or spread out over wide area
  - Problem / Health Effect: Forms PM – affects breathing and cardiopulmonary function; reduces body defense mechanisms
  - Sources: Combustion of sulfur-containing fuels (coal, oil products); metallurgical refining facilities
- **Carbon Monoxide (CO)** – Very Localized
  - Problem / Health Effect: Reduces Lung Function
  - Sources: Vehicles, Woodburning, Space Heating
- **Lead (Pb)** – Very Localized
  - Problem / Health Effect: Childhood Development;
  - Sources: Historic roadsides, foundries, smelters

# Air Quality Standards

- What standards have we historically had trouble meeting in Utah?

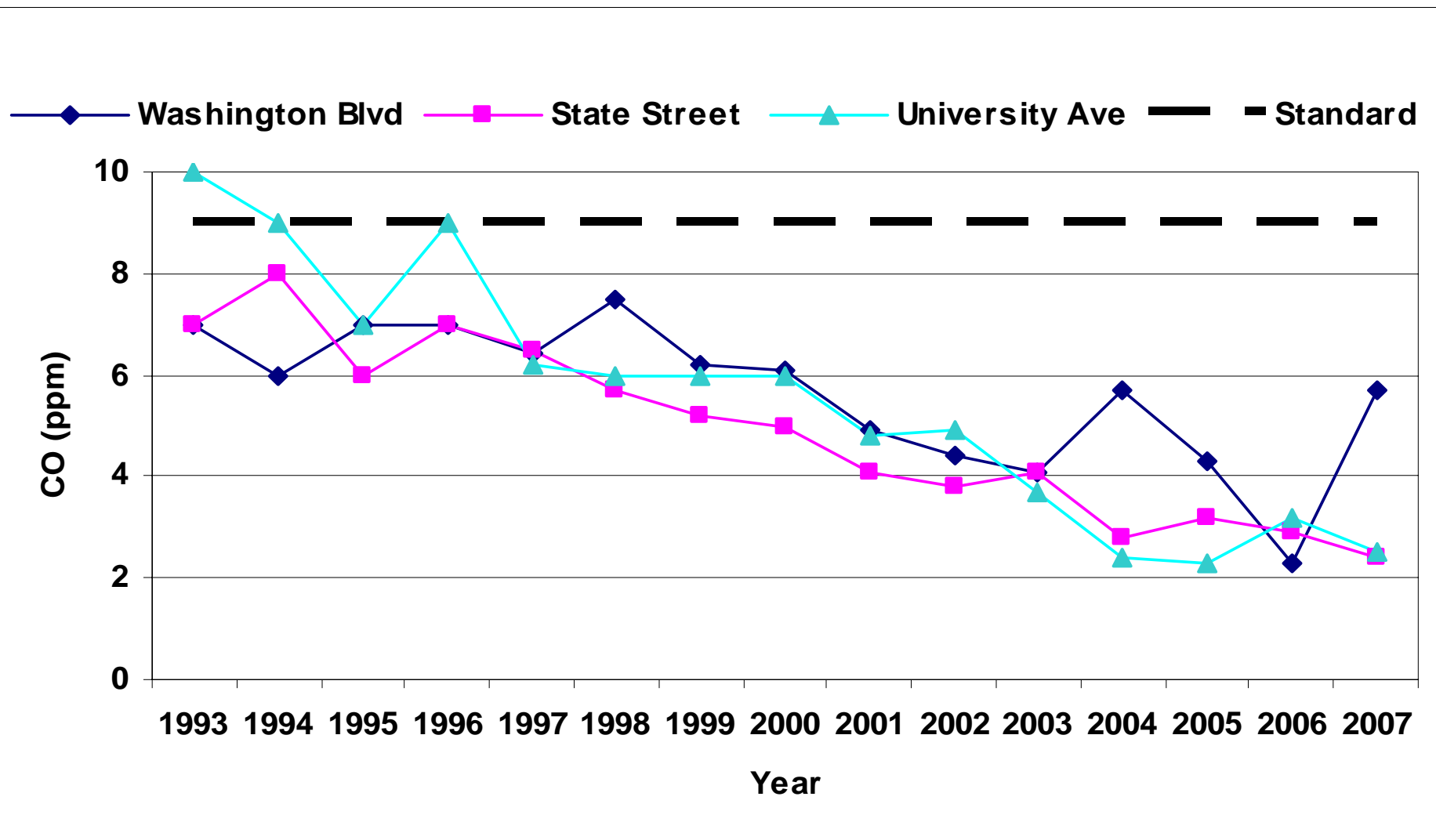
– Carbon Monoxide: 9 ppm (8-hr) **STANDARD MET** 19 ppm

– Ozone: 120 ppb (1-hr) **STANDARD MET** 156 ppb

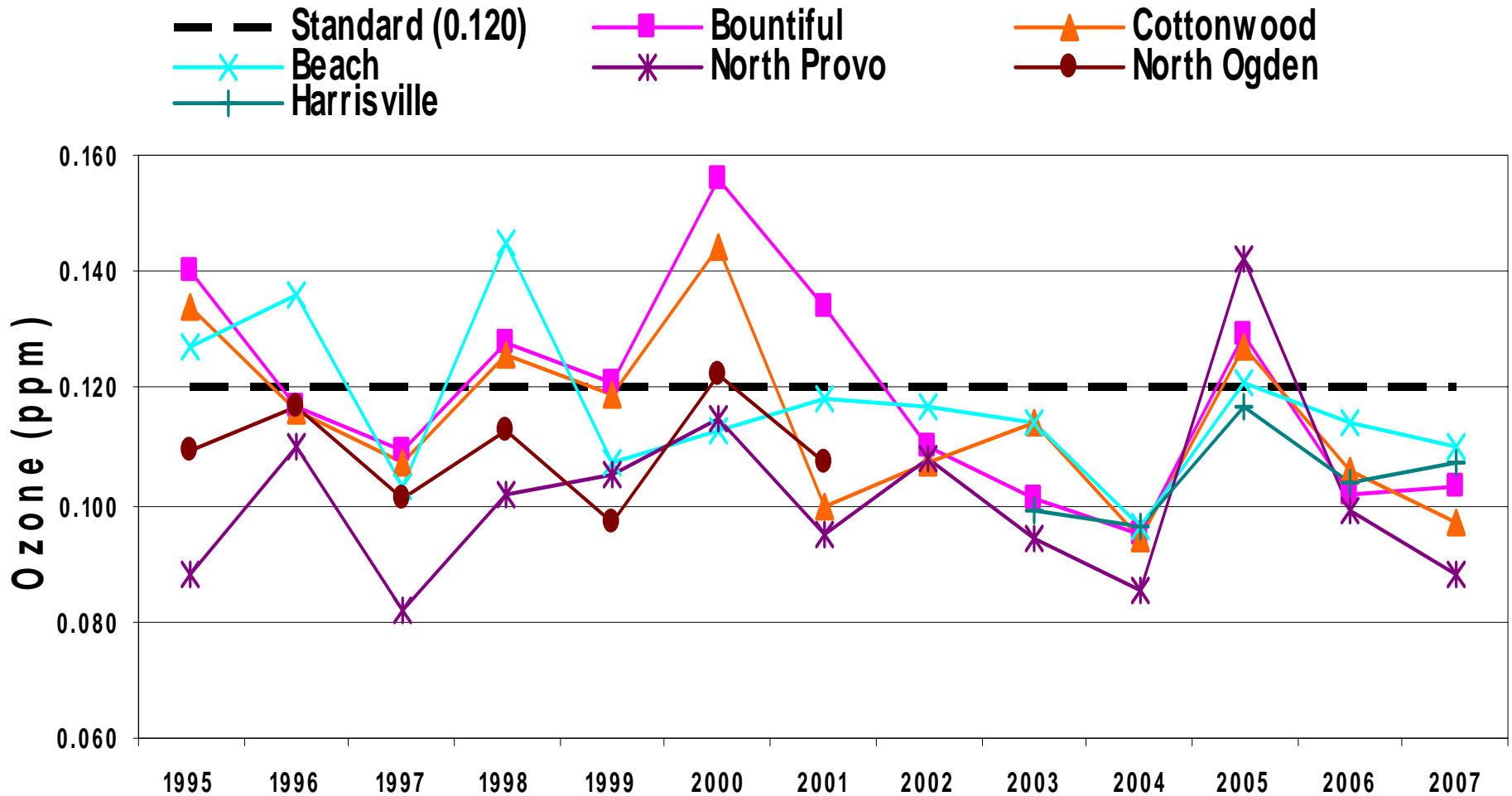
– PM<sub>10</sub>: 150 µg/(m<sup>3</sup>·yr) (24-hr) **STANDARD MET** 215 µg/m<sup>3</sup>

– SO<sub>2</sub>: 0.14 ppm (24-hr) **STANDARD MET** 0.59 ppm

# CO – 2<sup>nd</sup> High 8-Hr

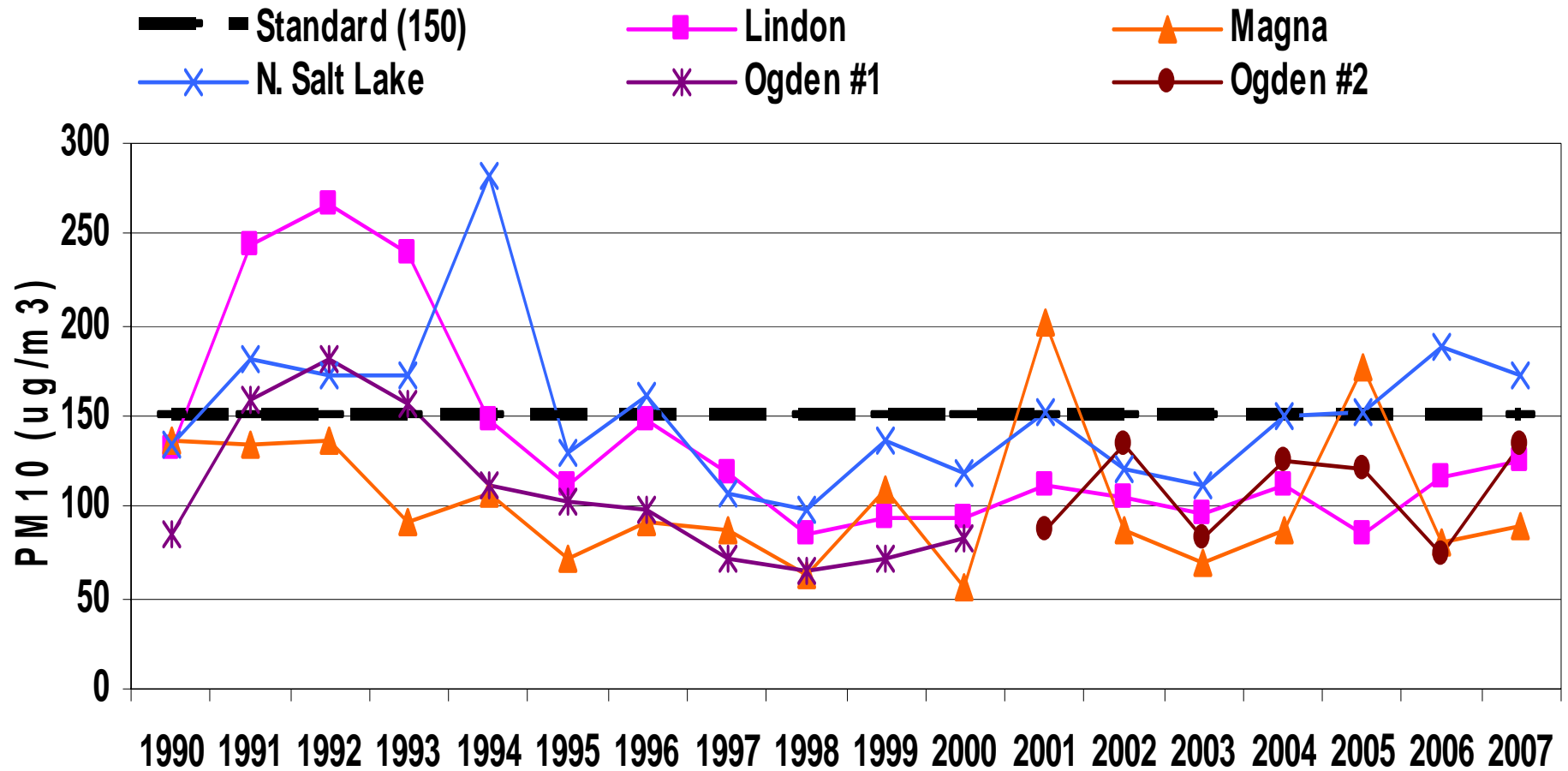


# Ozone – High 1-Hr



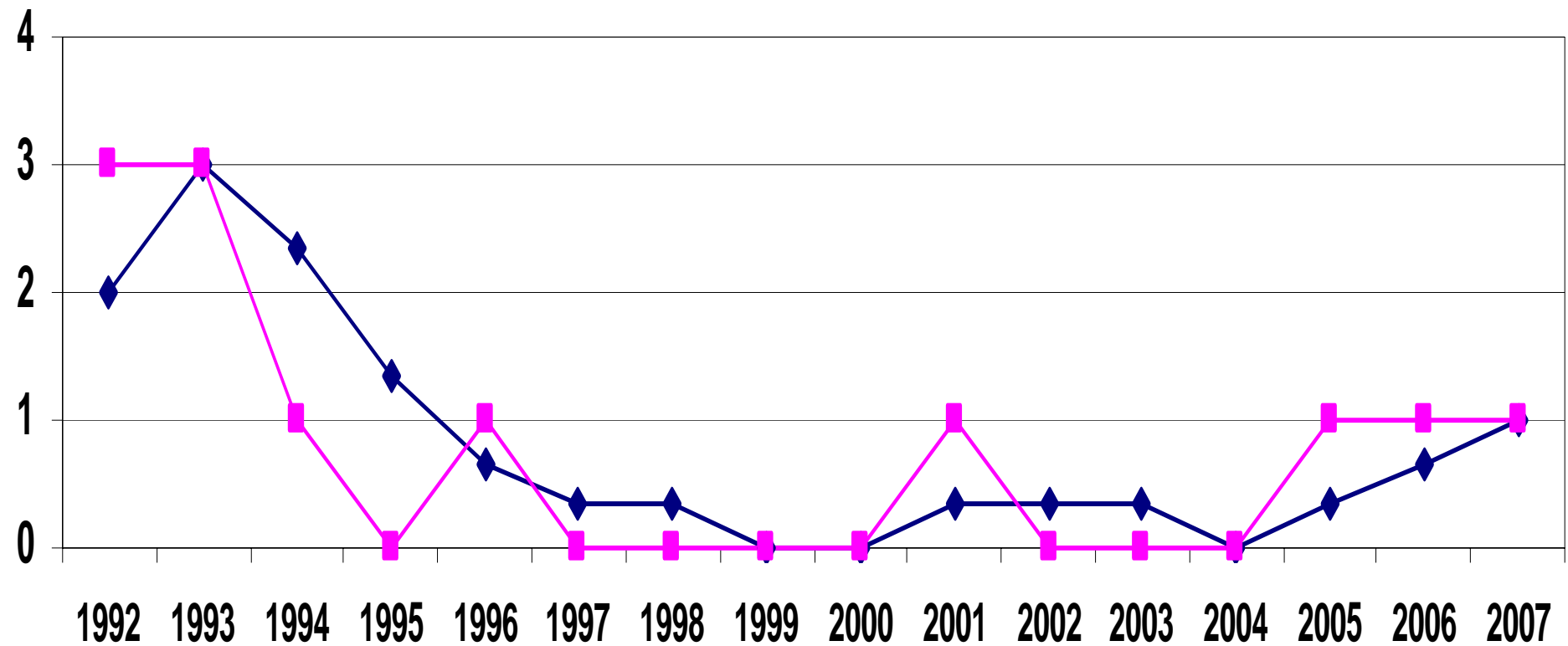


# PM<sub>10</sub> – 24-Hr

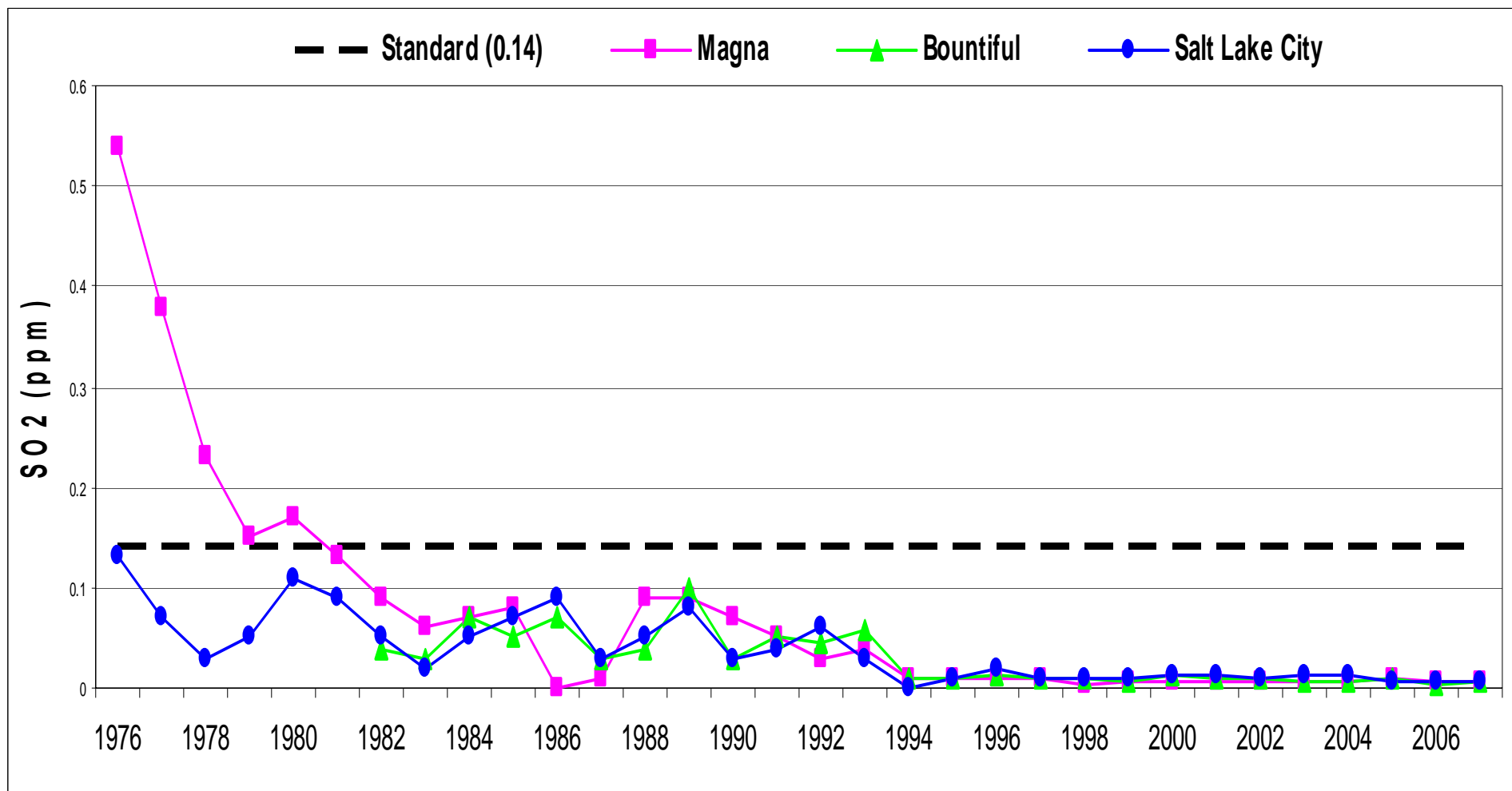


# PM<sub>10</sub> – 24-Hr – # of Exceedances

◆ 3-yr average of exceedances    ■ Number of exceedances

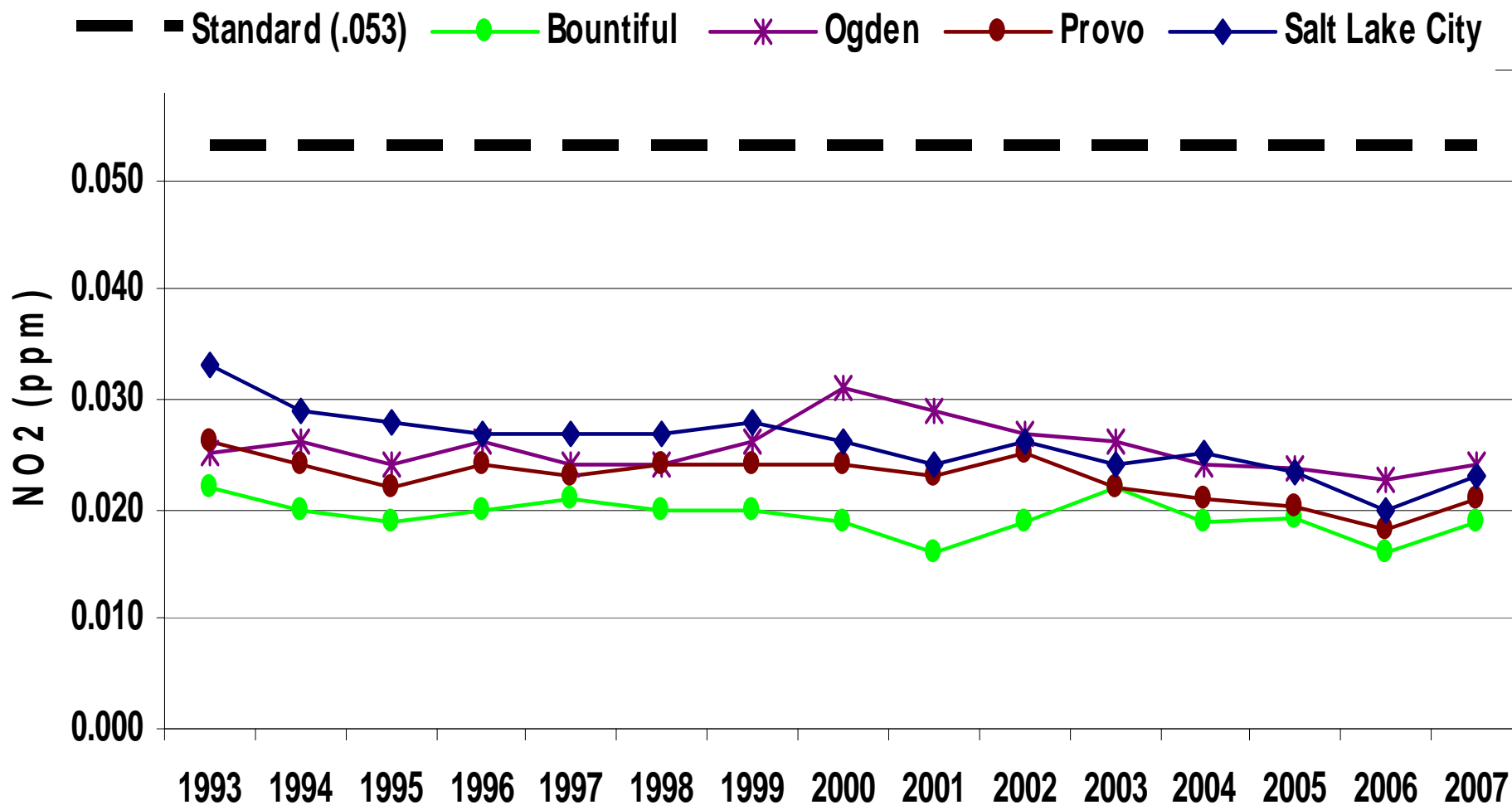


# SO<sub>2</sub> – 2<sup>nd</sup> High 24-Hr



# NO<sub>2</sub> Annual Average

Not Utah Problem – Except for O<sub>3</sub> and PM Formation





# Revised Air Quality Standards

- What new standards will impact Utah?
  - **PM<sub>2.5</sub>**: Recommended all or parts of Cache, Davis, Salt Lake, Utah, and Weber Counties be designated as nonattainment areas.
  - **Ozone**: On March 12, EPA will finalize new ozone 8-Hr standard(s).
    - Going from 0.08 to 0.080 will result in Salt Lake and Davis Counties being nonattainment.
    - Going to 0.070 could result in much of Utah becoming nonattainment, including National Park Areas
    - A W126 Secondary Standard could affect much of the Western U.S., including most of Utah.
    - Staff will brief the Board on the impact of the new standard in Utah.



# After EPA Promulgates a NAAQS

- Establish a Monitoring Network to identify areas of concern
- Request EPA designate areas as attainment/unclassifiable or nonattainment
- Develop an Emissions Inventory to identify pollution sources
- Develop a State Implementation Plan (SIP) to bring all areas into attainment of the standard



# Air Quality Monitoring Network

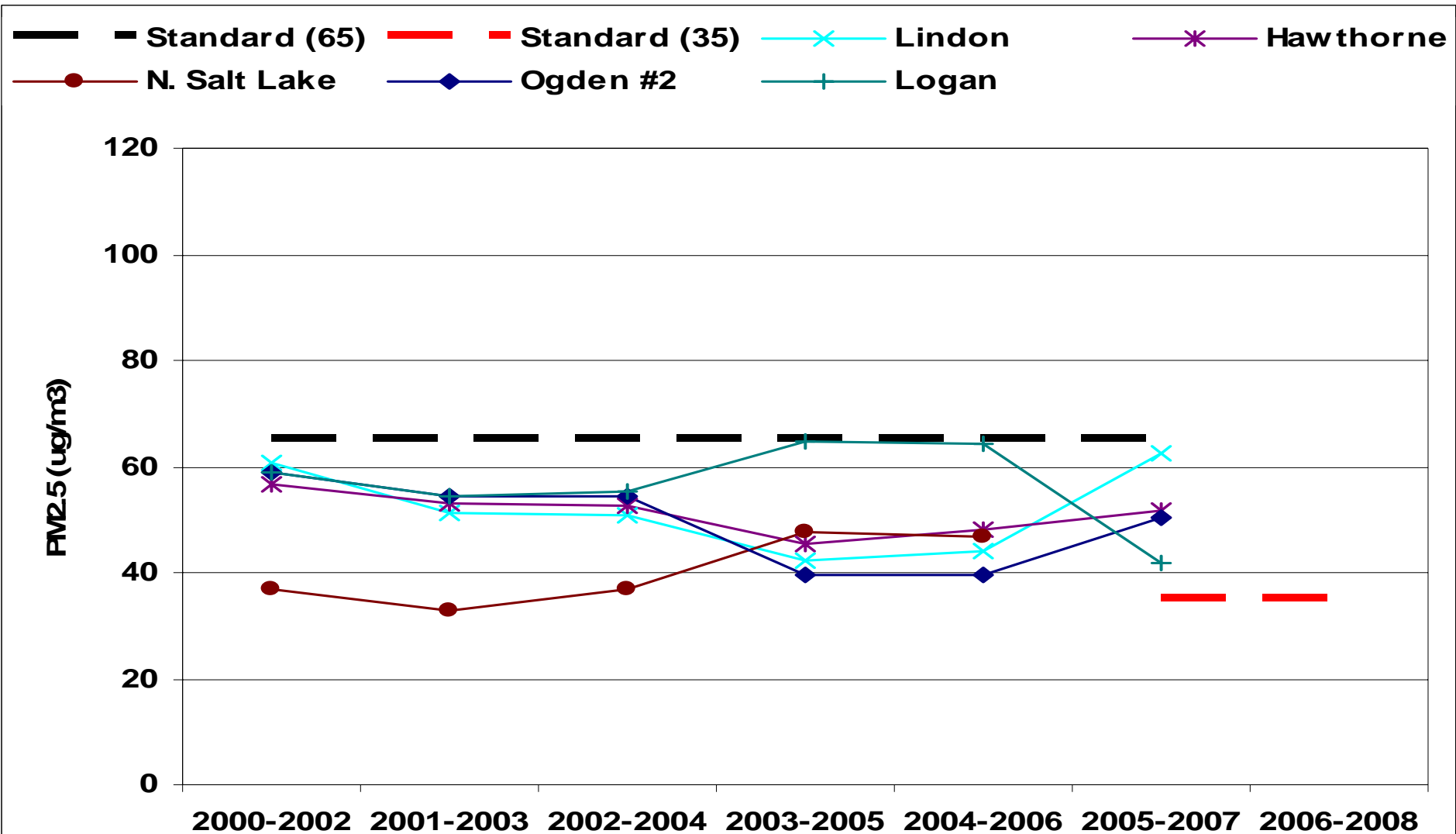
- Monitors are located throughout Utah
  - Concentrated along Wasatch Front
- Air Monitoring Center maintains the sites, and collects data

# Utah Division of Air Quality Monitoring Network

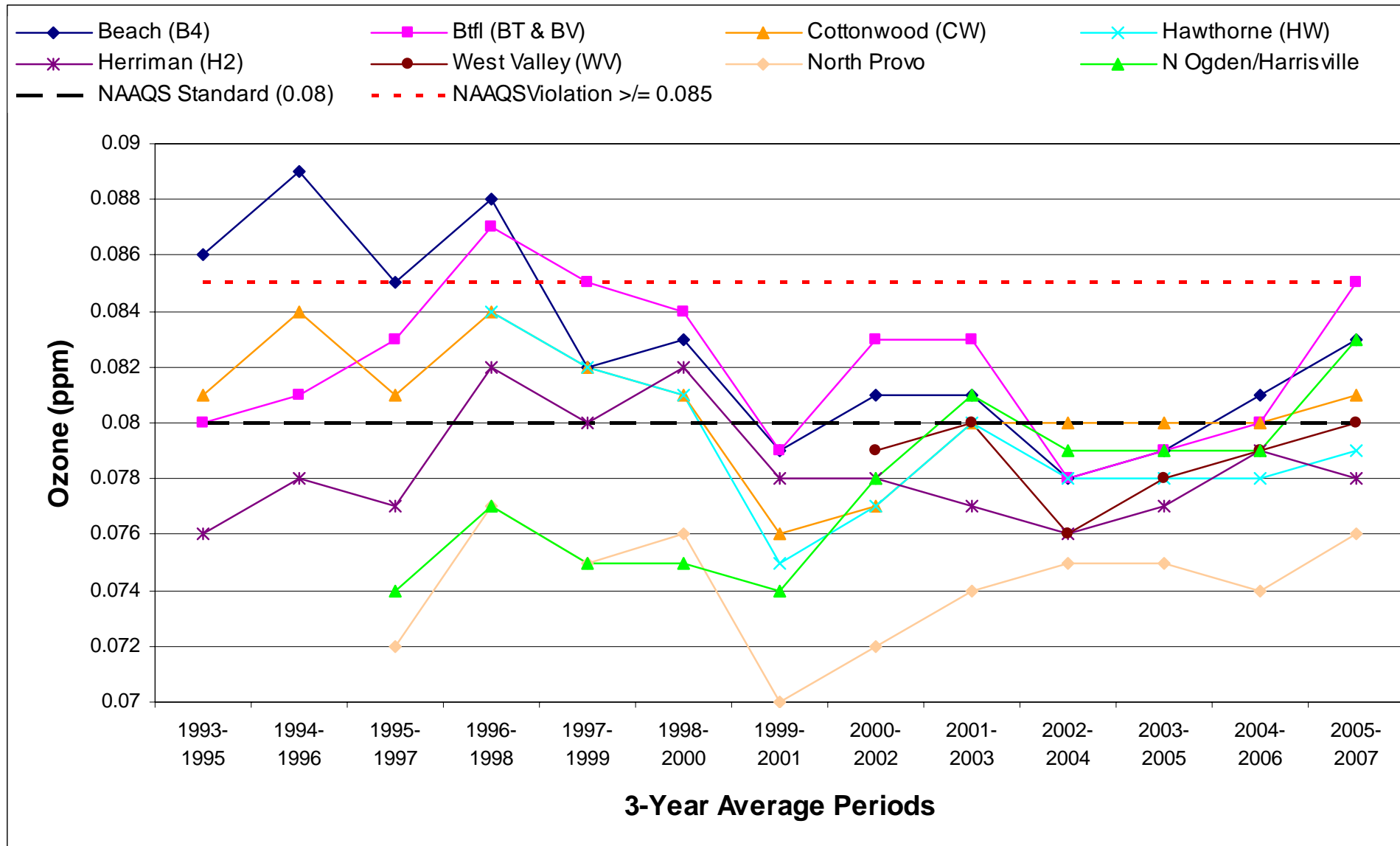




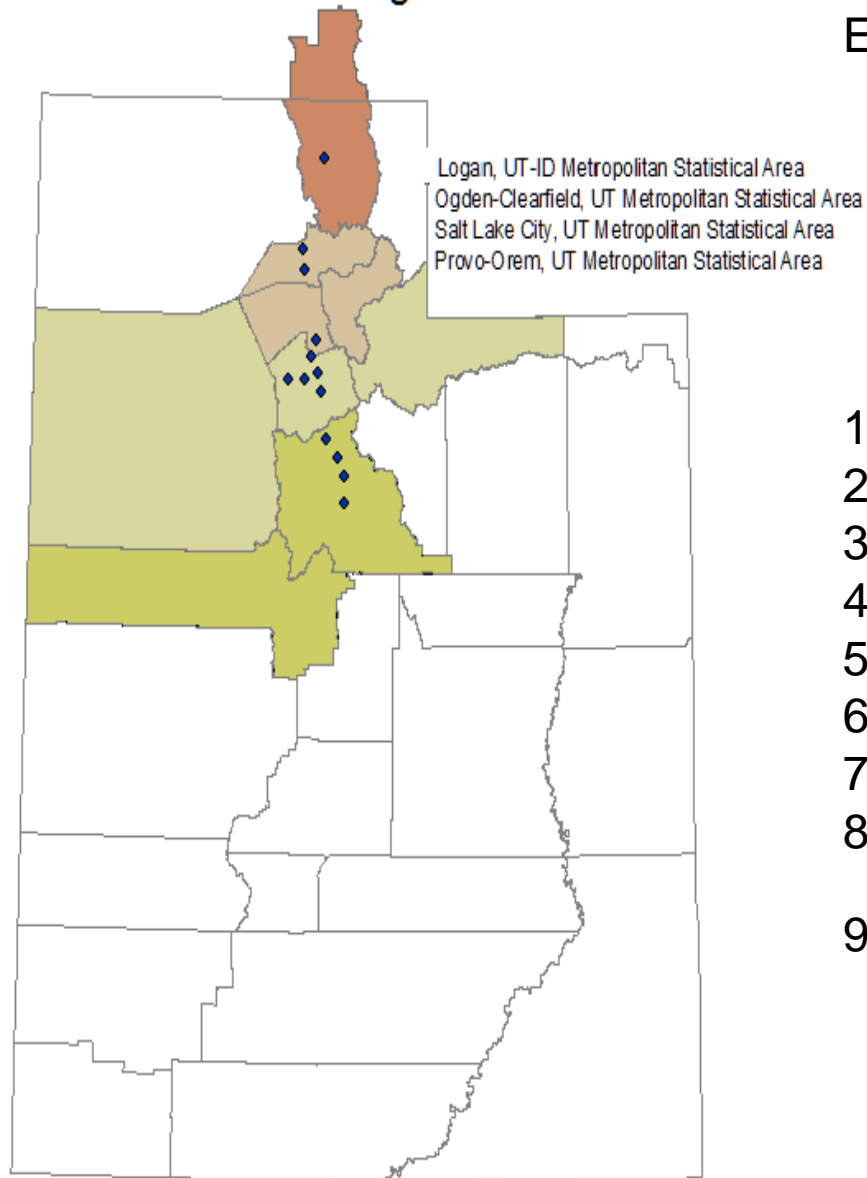
# PM2.5 – 3-Yr Average 98<sup>th</sup> Percentile of 24-Hr Concentrations



# 3-Yr Avg 4<sup>th</sup>-High Ozone 8-Hr Avg

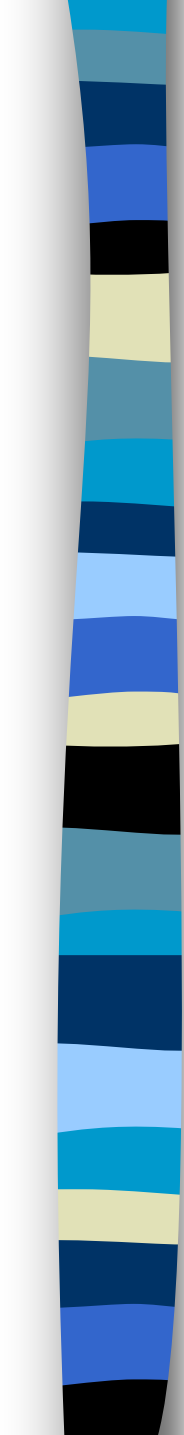
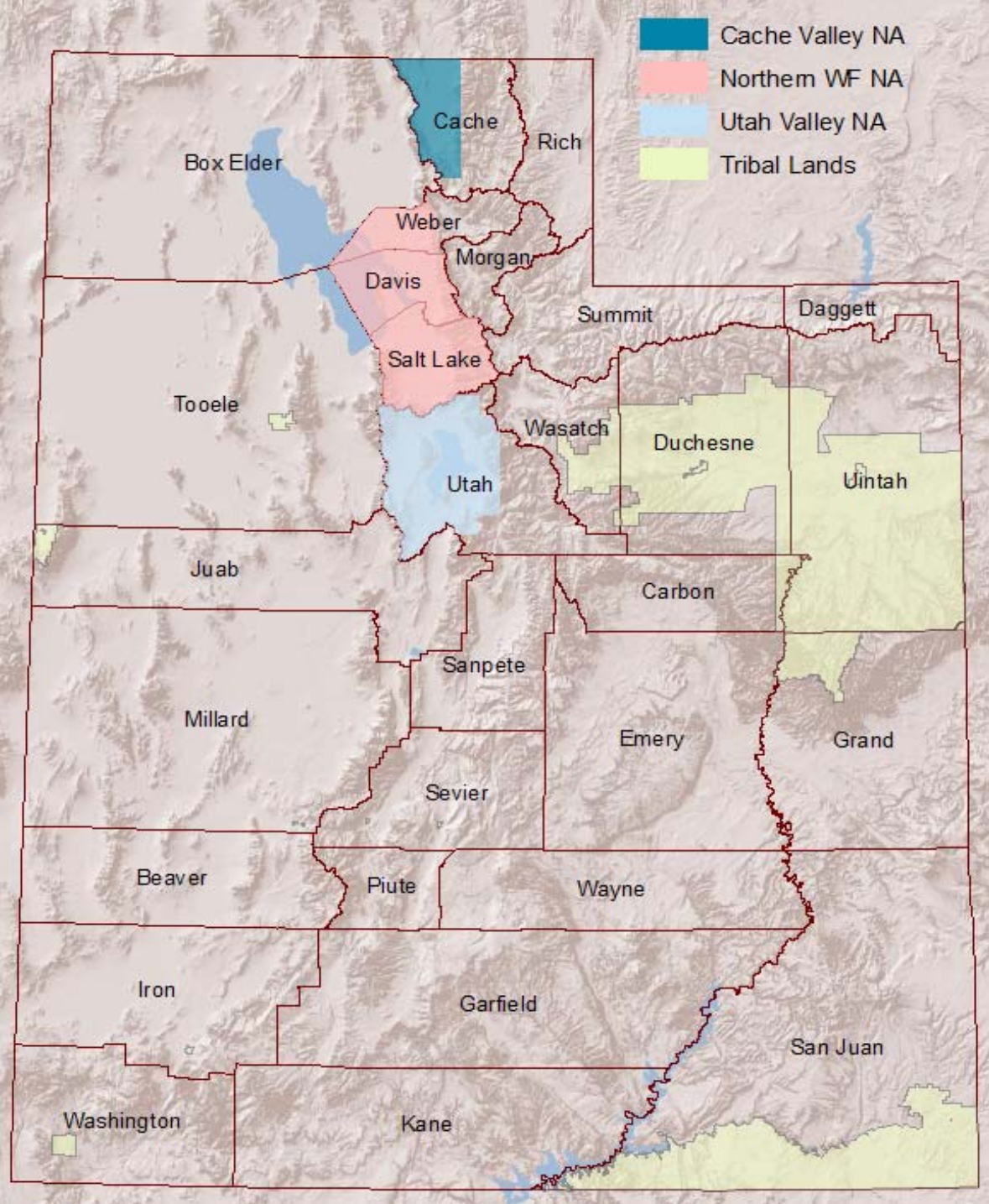


## Metropolitan Statistical Areas likely to violate a 35 ug/m<sup>3</sup> PM<sub>2.5</sub> NAAQS



EPA will consider requests for nonattainment area definitions that differ from the presumed definitions on a case-by-case basis, considering the following nine factors:

1. **Emissions**
2. **Air Quality**
3. **Population density**
4. **Traffic**
5. **Expected growth**
6. **Meteorology**
7. **Geography/Topography**
8. **Jurisdictional boundaries**
9. **Level of control of emission sources**





# Implementation in Utah

- EPA / State work together to finalize designations for up to 1 year after state submits the initial proposal (PM: 12/08, effective 4/09)
- Beginning 1 year after designations are effective, the MPOs for all Nonattainment Areas must demonstrate Transportation Conformity for their Plans (PM: 4/10)
- A State Implementation Plan is due to EPA 3 years after the designations are effective for each area not meeting the NAAQS (PM: 4/12)
- SIP must show attainment by 5 years after designations are effective (PM: 4/14)



# State Implementation Plan

- The SIP is based on the most current three years of data (PM: 2007-2009)
- Monitoring data is reviewed to identify sources and causes of the violation of the NAAQS
  - Ambient Pollution Concentrations
  - Meteorology
  - Filter Analysis



# State Implementation Plan

- We create an emissions inventory to determine where the pollutants come from that we are finding on our filters
- We develop computer models that describe the relationship between the pollutants that are emitted, the meteorology, and atmospheric chemistry (The Model)



# SIP Development:

## Base Year Emissions Inventory

- Identify Point, Area, Mobile emissions sources
- Obtain On-Road Mobile inventory from local MPO or Traffic data from UDOT
- SIP-Specific Inventory:
  - Seasonal vs. annual
  - Local factors vs. national averages
  - Case specific – Shut downs, Fires, Major disruptions in traffic, Construction, etc





# SIP Development:

## Projection Year Emissions Inventory

- Using growth projections from the Governor's Office of Planning and Budget, we project what the emissions will be in the future if nothing changes (the base case)
- We obtain projected On-Road Mobile Projections from the MPOs
- We apply those emissions to The Model to project what the ambient concentrations will be in the future
- If those projections don't meet the NAAQS by the deadline in the CAA, then....



# State Implementation Plan

- Working with stakeholders, we identify potential control strategies
- We identify what the changes will be in the future emissions inventory from the controls
- We re-run The Model using the revised inventory to identify the effectiveness of the control strategies



# State Implementation Plan

- Based on the costs and benefits of the various control strategies, we (including stakeholders) identify a suite of controls that could lead to attainment
- We run The Model with all the identified controls to verify that it still projects attainment of the NAAQS
- We document all of the above actions, the controls, and how we reached attainment in the SIP



# Issues With Development of SIPs Today

- Low-hanging fruit is gone
- Seeking credit for innovative approaches that are being explored
  - Voluntary measures
  - Economic incentive programs
  - Episodic controls (Choose Clean Air)
  - Innovative technologies



# In the Mean Time:

- There are state and federal programs going into effect that are reducing pollutants of concern
- DAQ is working with stakeholders to come to better understanding of the problem
- We are proceeding with the development and implementation of programs to reduce pollution
- We are already collecting information needed to feed The Model – and perfecting our skills in using it



# **Current DAQ and Federal programs targeting both diesel and gasoline vehicles**

## **■ State:**

- Gasoline and diesel inspection/maintenance (I/M)**
- Retrofitting of school buses and snowplows**
- Encourage idling reduction ordinances**
- Implementation of On-Board Diagnostics (OBD) testing**

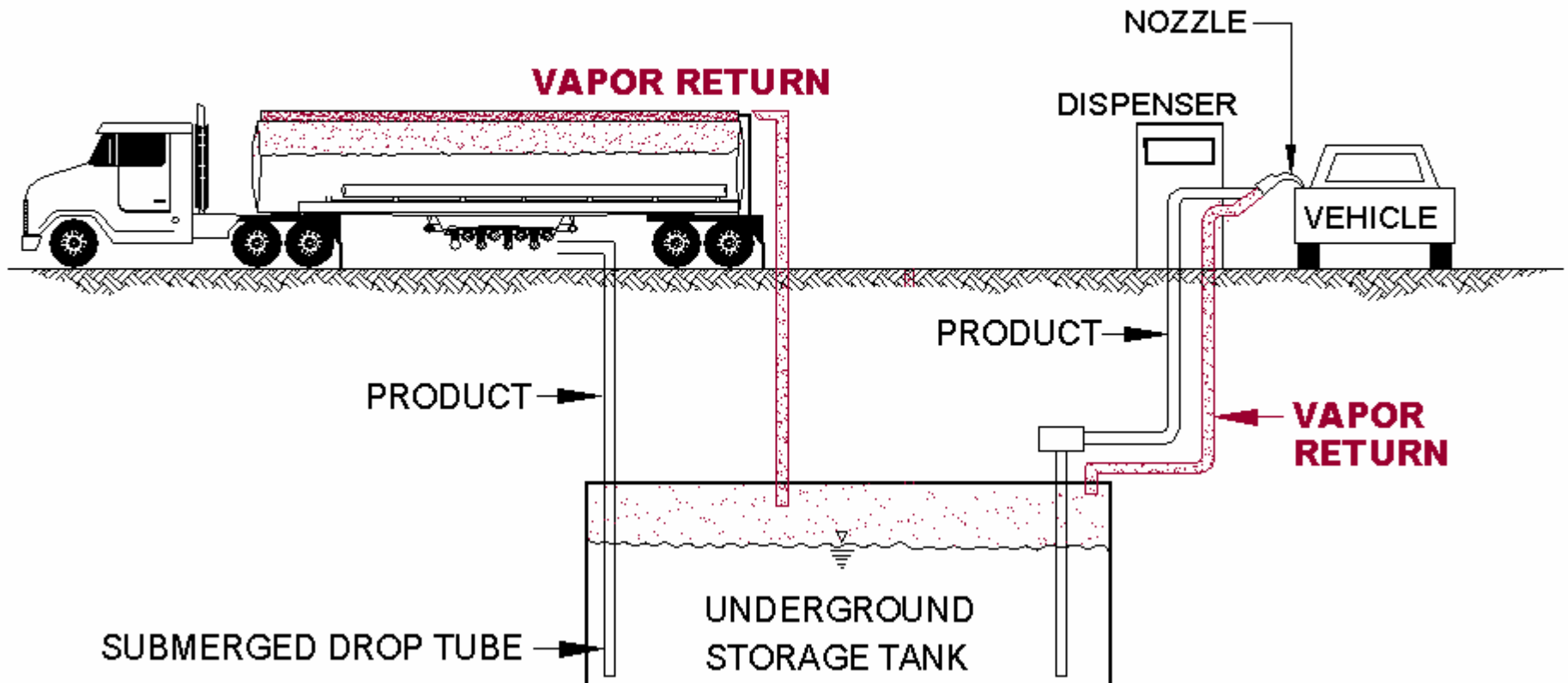
## **■ Federal:**

- Tier II tailpipe standards**
- Low-sulfur diesel (2006) and gasoline (2009)**
- Heavy-duty engine and highway vehicle standards**
- “2004 Rule” for model years 2004 – 2006**
- “2007 Rule” for model years 2007 - on**
- New locomotive engine standards**

**Tier II: Manufactured in 2005 – 2010**

**Tier III: Manufactured in 2011- 2014**

# Stage I Vapor Recovery Systems





# Stage I Implementation Schedule

Met with Stakeholders in January, 2006 Based on their comments, our schedule for a proposed rule:

- Present to AQ Board for comments April 2, 2008
- Rulemaking Process May/June 2008
- Present to AQ Board for approval July/Aug 2008
- Effective date August 2008
- Begin Implementation phase-in April 30, 2009
  - Three year phase in
  - Based on county and throughput
- Implementation Complete (statewide) April 30, 2011





# State Implementation Plan

- The SIP, the rule that incorporates the SIP into State rules, and the rules that implement the control strategies in the SIP all go through the rulemaking and public hearing process through the Air Quality Board
- The approved SIP is sent to EPA
- EPA has 6 months to verify it is complete
- EPA has 12 additional months to review it and either approve or disapprove it



# EPA Actions - Summary

- Since 1991, we have submitted 58 significant SIP revisions to EPA
- EPA did Completeness Finding for 4
- EPA Acted on 23 (Full or Partial Approval)
- 9 of the EPA Actions were more than 2 years late.
- EPA currently holding 35 SIP revisions
  - Some over 12 years old
  - Some for Standards that have been revised



# Results of EPA's Failure to Act

- Rules and SIP still effective in Utah
  - They are still Utah State Law
  - They are not federally enforceable
- Some point sources are subject to two sets of conflicting requirements:
  - SIP/Rules adopted by the AQB
  - SIP/Rules approved by EPA
- Sources can not obtain Title V permits
- SIPs do not Age Well – things change



# Other National Issues that Require SIP Revisions

- Regional Haze
- Hazardous Air Pollutants (HAPS)
- Mercury
- Climate Change
- Changing Federal Programs



Any Questions on SIP  
Development?



# Air Modeling at DAQ

*Utah's Air Quality – What Does the Future Hold?*

- 1. What Are Models? – *Brief Description***
- 2. Why Do We Use Models?**
- 3. How Do We Use Models?**



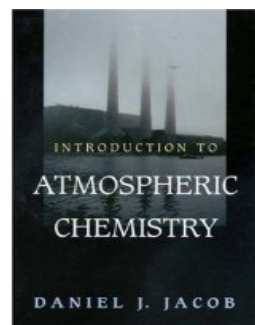
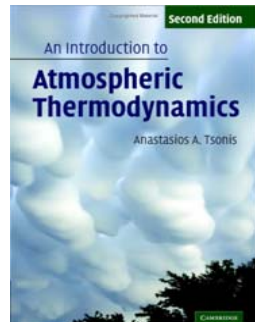
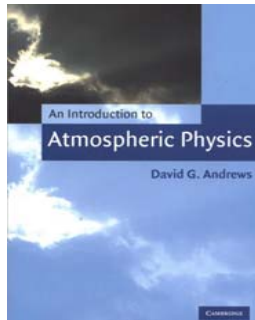
# 1. What Are Models?

from the  
**Theoretical**

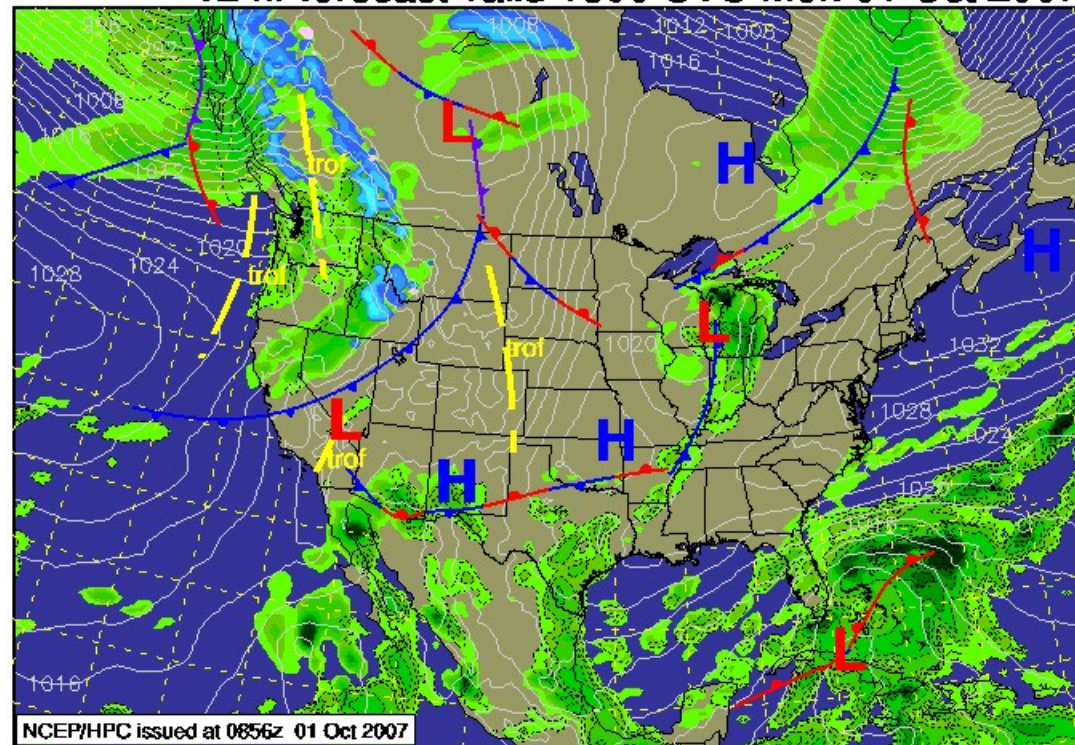
to the



**Practical**



12 hr forecast valid 1800 UTC Mon 01 Oct 2007



NCEP/HPC issued at 0656z 01 Oct 2007





## 2. Why Do We Use Models At DAQ?

### 1) Fill in “Un-Monitored” Areas



### 2) Model For Growth



SLV in 1972 – Courtesy NASA



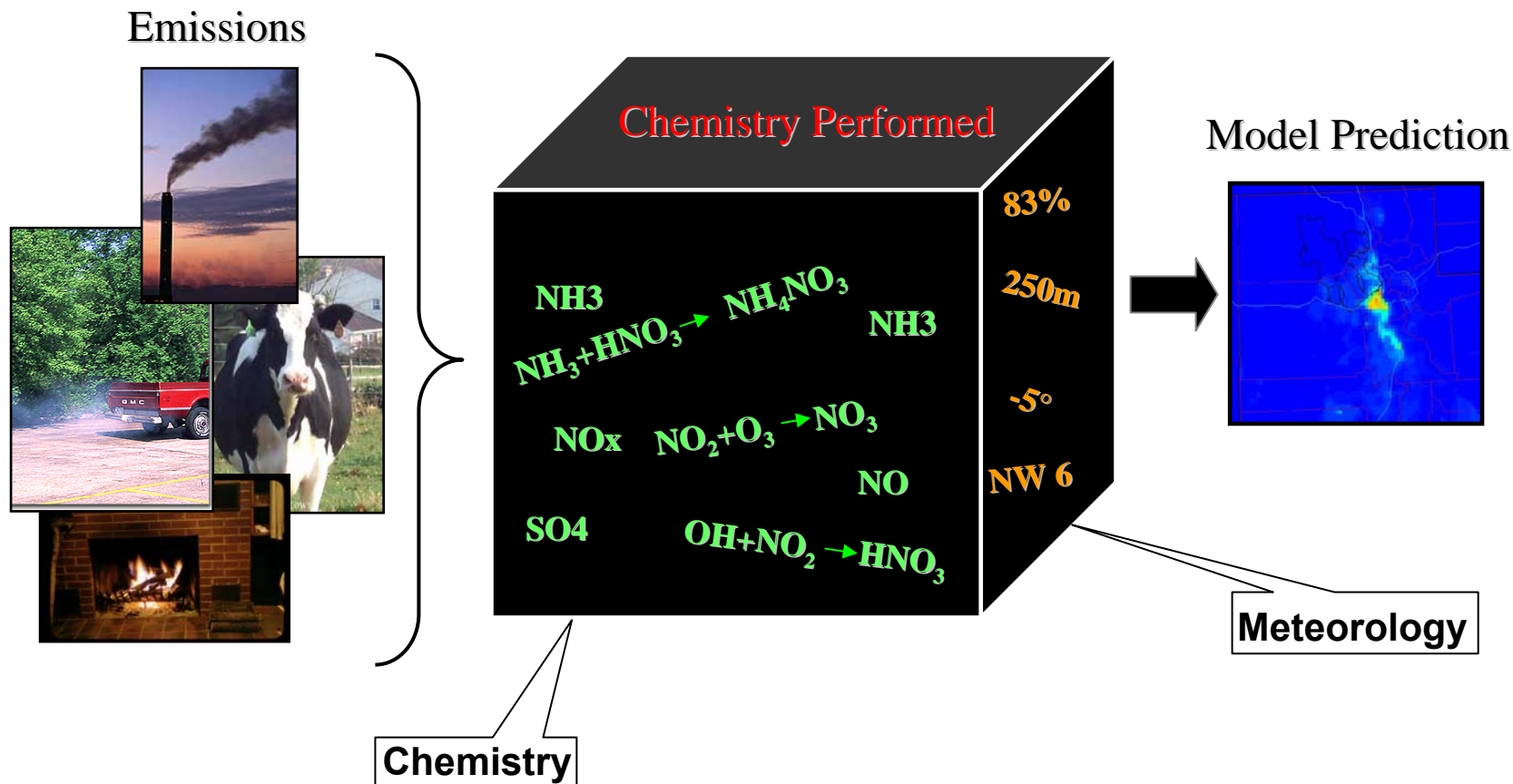
SLV in 2000 – Courtesy NASA

**What About 10 Years From Now?**



## 2. Why Do We Use Models At DAQ? *(Continued ...)*

### 3) Complex Chemistry: Summer Ozone & Winter Particulate (PM<sub>2.5</sub>)



### 3. How Do We Use Models For SIP Development?

- *Basis for the “Attainment Demonstration”*
- *But Can We Believe Them?*

Two Key Issues:

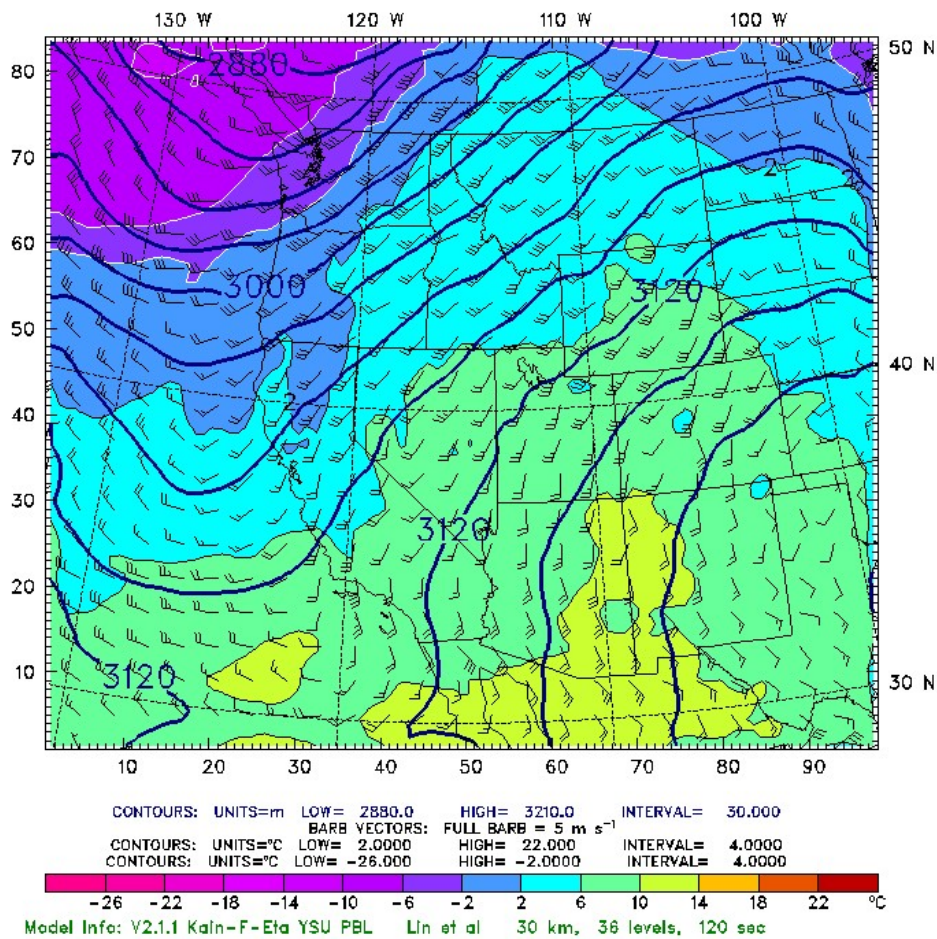
1. The Science – The Model’s “Skill”
2. The Inputs:

**Garbage In = Garbage Out !!**



?

NATIONAL SECURITY PROJECTS
Army Test-Range Support
4DWX
Army Test-Range
Future Combat
Sensor Fusion And Advanced Modeling
Met Data Server
Bioaerosol Study
TAMDAR
Global Climatology
Building And Urban Protection
Joint Urban 2003
Regional And National Defense
Pentagon Shield
Capital Region
NYC Meteorology
Special Mission Support
Torino Olympics
Athens Olympics
Salt Lake Olympics
Enduring Freedom
Iraqi Freedom
Improved Operational Weather Services
West Africa
Israeli Air Force
NYC Meteorology



Meteorological Inputs

\* The Best

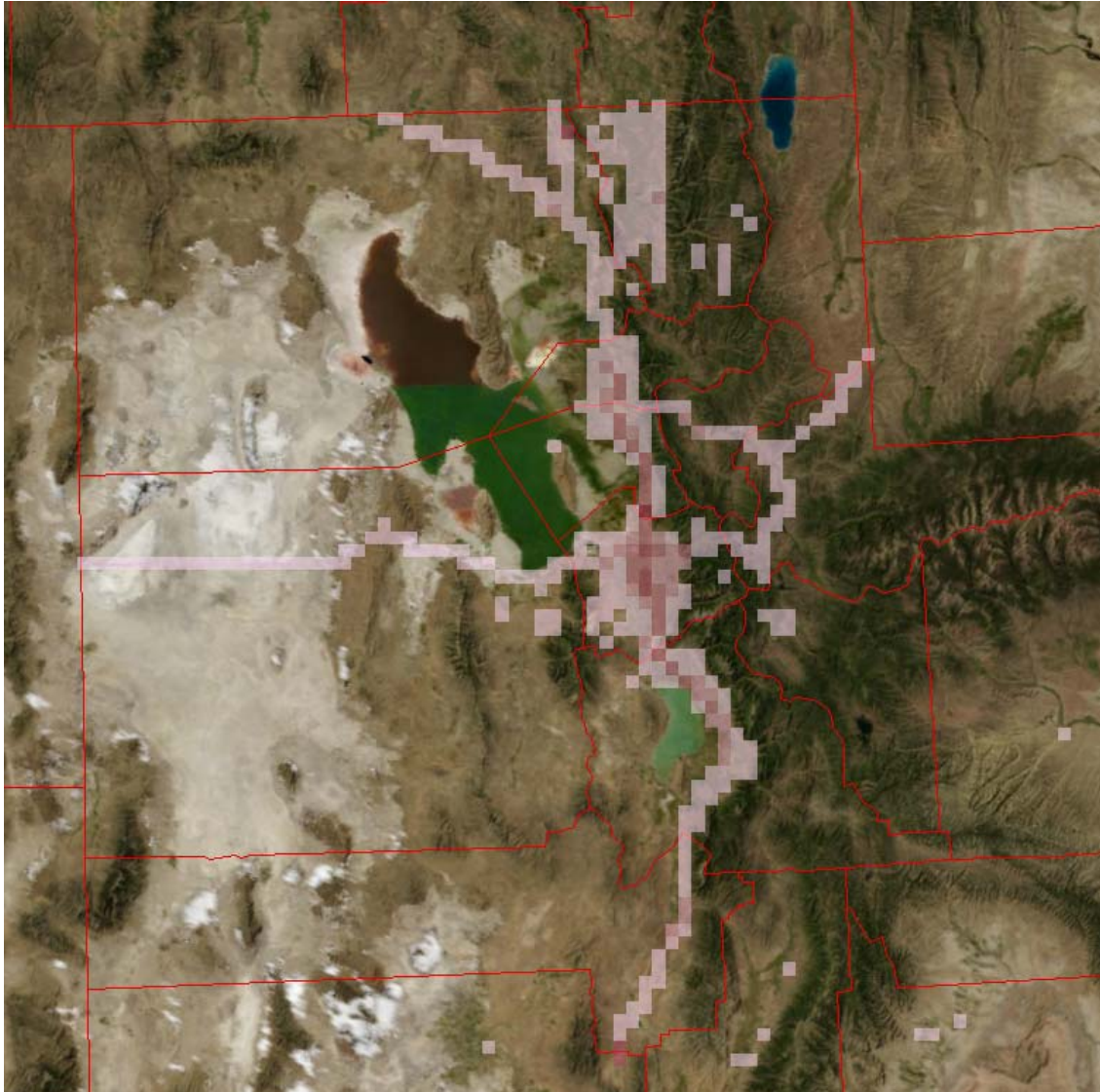
## REFERENCES

## TESTIMONIALS

Letter from Tyler Cruickshank  
 State of Utah, Department of Environmental Quality >more (jpg)



## Emissions Input: From the experts!



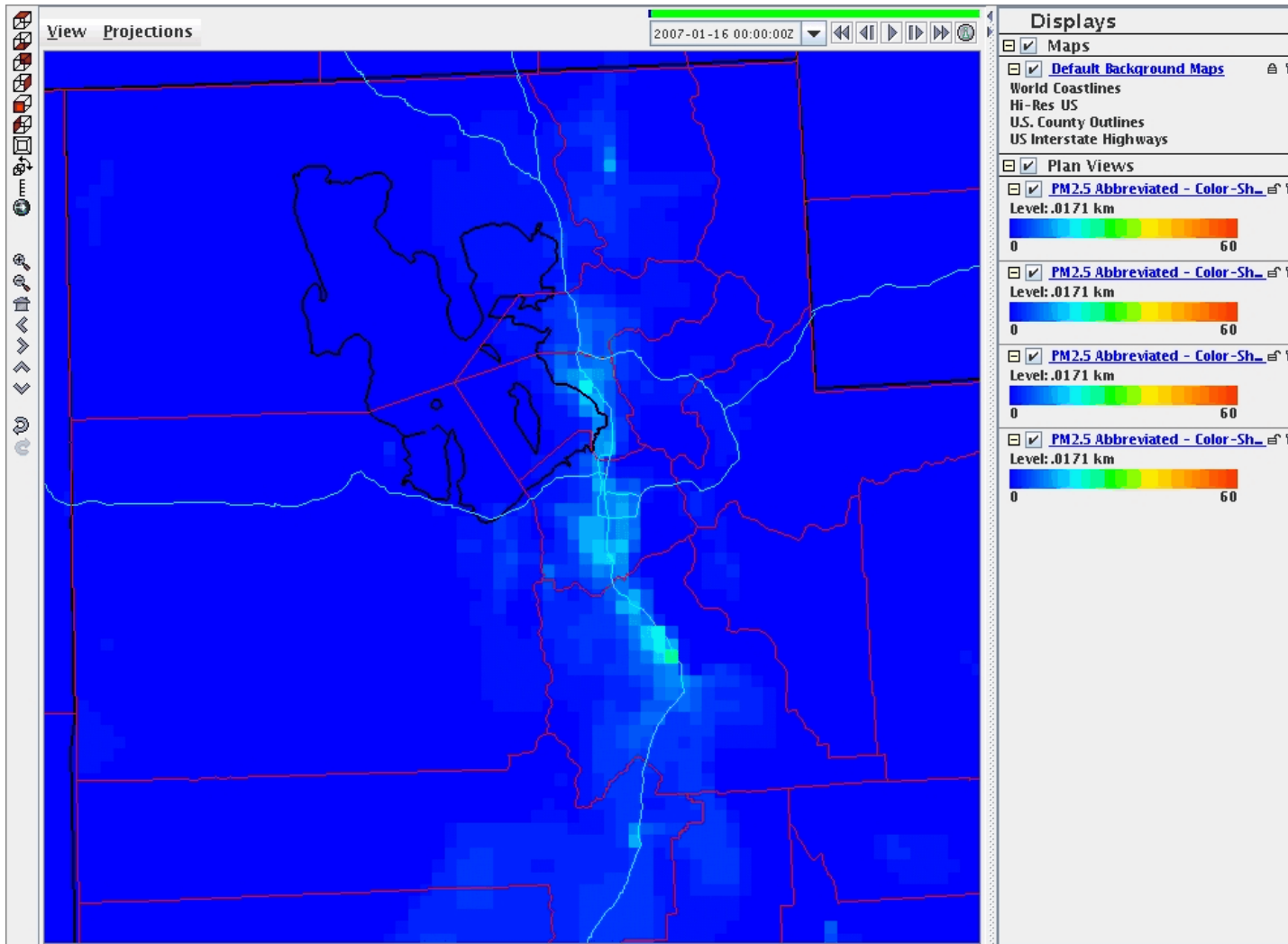
- UDOT
- Wasatch Front Regional Council
- Mountainlands Assoc. of Govt's

### Other Providers:

- Industry Sources
- Governor's OPB

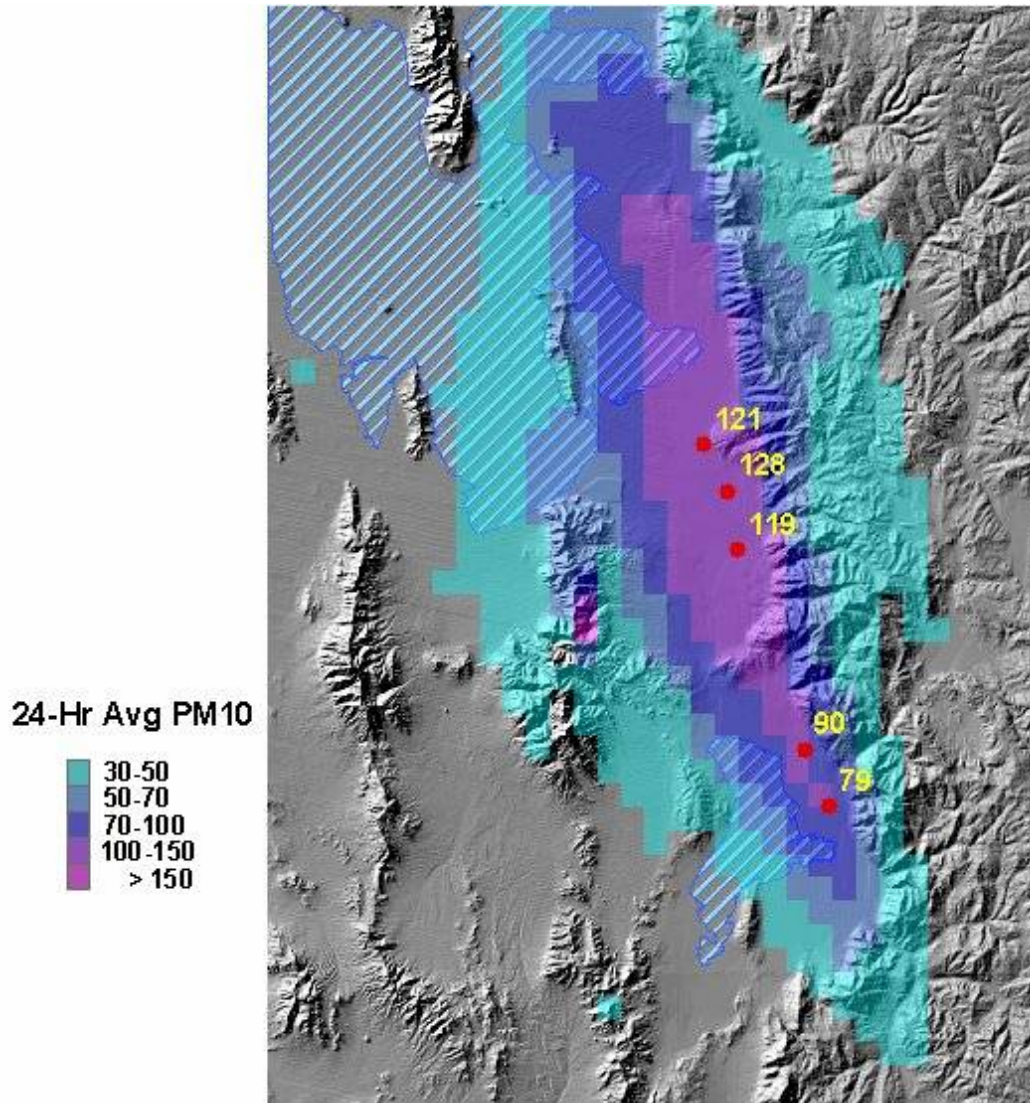


## Community Multiscale Air Quality



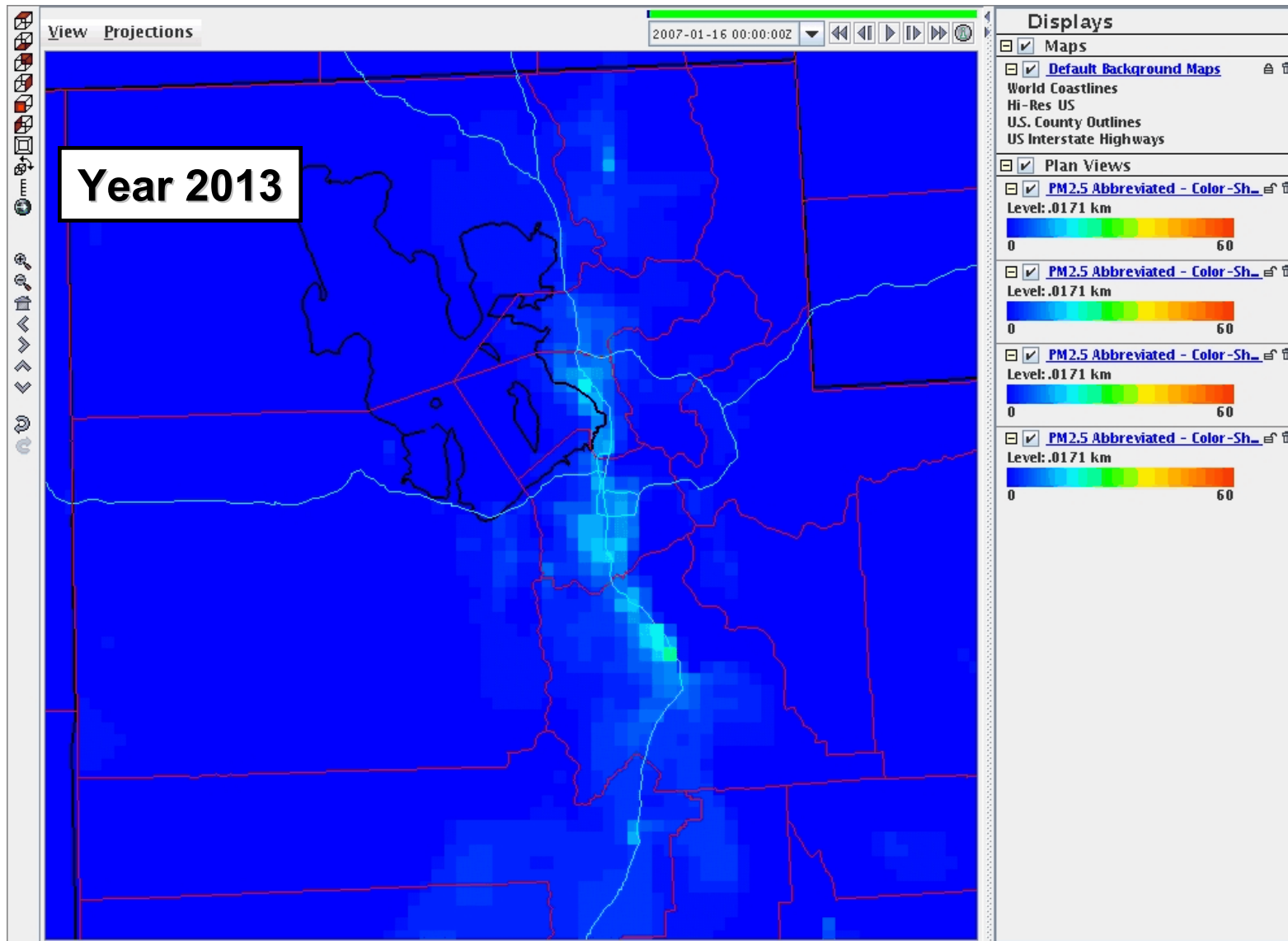


**Model Skill + Inputs = Performance**  
***Model output verified against monitored data.***



# Model future year attainment demonstration for SIP

*Use the same meteorology with projected emission inventory.*



# Parting Thoughts



**1. Getting a jumpstart on the SIP process**



**2. Need prompt EPA review of the technical work**